

the plurality of sublayers being disposed adjacent to a target, the impedance value of the first sublayer being less than or equal to the impedance value of the element of the transducer, the impedance value of the last sublayer being greater than or equal to the impedance value of the target, the impedance values of the sublayers decreasing from the first to the last sublayer, wherein each of the sublayers has a thickness of less than about 100 μm , preferably less than about 75 μm , more preferably less than about 50 μm , and most preferably less than 10 μm .

REMARKS

The Office action dated January 16, 2002 and the cited references have been carefully considered.

Claims 1-24 are pending. Claims 1-3 and 5-14 are rejected under 35 U.S.C. § 102(b) as being anticipated by Seyed-Bolorforosh et al. (U.S. Patent 5,553,035; hereinafter "seyed-Bolorforosh"). Claims 15-16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Seyed-Bolorforosh in view of Hanafy et al. (U.S. Patent 5,651,365; hereinafter "Hanafy"). Claims 17-21 are rejected under 103(a) as being unpatentable over Hanafy in view of Kline-Schoder (U.S. Patent 5,938,612; hereinafter "Kline-Schoder"). The Applicants respectfully traverse all of these rejections for the reasons set forth below.

Claim 22-24 are allowed. Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The Applicants wish to thank the Examiner for indicating that claims 22-24 are allowed and claim 4 is allowable. Claim 4 has been amended to become independent. Therefore, it is now in condition for allowance. Early allowance of claim 4 is respectfully requested.

Claim Rejection Under 35 U.S.C. § 102(b)

Claims 1-3 and 5-14 are rejected under 35 U.S.C. § 102(b) as being anticipated by Seyed-Bolorforosh. The Applicants respectfully traverse this rejection because Seyed-Bolorforosh does not disclose expressly or inherently each and every element of claims 1-3 and 5-14.

"Anticipation requires the presence in a single prior art reference disclosure each and every element of the claimed invention, *arranged as in the claim.*" *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 221 U.S.P.Q. 481, 485 (Fed. Cir. 1984) (emphasis added). "Absence from the presence any claimed element negates anticipation." *Kloster Speedsteel AB v. Crucible Inc.*, 230 U.S.P.Q. 81, 84 (Fed. Cir. 1986).

Seyed-Bolorforosh discloses a transducer having an integral acoustic impedance matching portion "that extends in a unitary fashion from a transducer portion." See; e.g., column 3, lines 33-39 (emphasis added); Figures 1-5. It is unquestionable that Seyed-Bolorforosh's impedance matching portion and transducer portion are formed into a single integral unit. Seyed-Bolorforosh repeatedly refers to "the integral acoustic impedance matching structure." Column 1, lines 16-17 ("transducers devices having integrated acoustic impedance matching layers"); column 3, line 38 ("[t]he integral acoustic impedance matching structure"); column 6, lines 26-27 ("the two portions 22 and 24 are integrally formed"). Seyed-Bolorforosh's matching structure is formed directly into the transducer elements by cutting grooves into these elements. As such, at least a portion of the material of the matching structure (the part remaining after cutting) is always made of the material of the transducer. Since Seyed-Folorborosh's impedance matching structure is formed into the transducer, it can never be a series of layers attached together, as recited in claims 1-3 and 5-14.

In contradistinction, claims 1-3 and 5-14 recite a matching layer comprises of a plurality of sublayers attached together, each sublayer having a different impedance value, and the impedance values decrease from the value of the first sublayer adjacent the transducer to the value of the last sublayer adjacent the target. The matching layer of claims 1-3 and 5-14 are not formed as an integral part of the transducer. There is no requirement that a material of the matching layer of claims 1-3 and 5-14 be the same as that of the material of the transducer element.

Since Seyed-Bolorforosh does not teach or disclose each and every element of claims 1-3 and 5-14, Seyed-Bolorforosh does not anticipate these claims.

Claim Rejection Under 35 U.S.C. § 103(a)

Claims 15 and 16

Claims 15 and 16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sayed-Bolorforosh in view of Hanafy. The Applicants respectfully traverse this rejection because a combination of Sayed-Bolorforosh and Hanafy does not teach or suggest all of the elements of claims 15 and 16.

"[T]he legal conclusion of obviousness [under 35 U.S.C. § 103(a)] requires that there be some suggestion, motivation, or teaching in the prior art whereby the person of ordinary skill would have selected *the* components that the inventor selected and used them to make the new device." *C.R. Baird, Inc. v. M3 Systems, Inc.*, 48 U.S.P.Q.2d 1225, 1231 (Fed. Cir. 1998) (emphasis added). Thus, in order for the prior art to render the claimed invention obvious, all of the elements thereof must be taught or suggested in the prior art. MPEP § 2143.03 (7th ed., Rev. 1, Feb. 2000) ("To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.") "What must be found obvious to defeat the patentability of the claimed invention is the claimed combination." *The Gillette Co. v. S.C. Johnson & Son, Inc.*, 16 U.S.P.Q.2d 1923, 1927 (Fed. Cir. 1990).

As pointed out above, Sayed-Bolorforosh discloses an impedance matching portion as an integral part of the transducer element. Sayed-Bolorforosh does not suggest a matching layer that is made of a plurality of sublayers being attached together and having different impedance values, as recited in claims 15 and 16. Similarly, Hanafy does not disclose, teach, or suggest an impedance matching layer that is made of a plurality of sublayers being attached together and having different impedance values. The Applicants respectfully submit that the Examiner has misunderstood Hanafy's disclosure. Hanafy's first and second matching layers are disposed separately on odd- and even-numbered transducer elements, and each matching layer has a single layer. They are not attached together to be disposed on one transducer element. Column 3, lines 51-57; column 7, lines 7-16. Nowhere in a combination of Sayed-Bolorforosh and Hanafy can one of ordinary skill find any suggestion of a matching layer made of a plurality of sublayers having varying impedance values.

Sayed-Bolorforosh not only "does not clearly suggest method of forming each of the sub layers," as the Examiner admitted, he does not at all suggest making a matching layer comprising of a plurality of sublayers. In the absence of a teaching or suggestion in the prior art to make the claimed invention, "[i]t is the Examiner's duty to explain the specific understanding or principle within the knowledge of a skilled artisan that would motivate one with no knowledge of the applicant's invention to make the combination." *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1458 (Fed. Cir. 1998). The Applicants respectfully submit that by a mere conclusory statement the Examiner has not satisfied this burden of proof.

Since a combination of Sayed-Bolorforosh and Hanafy does not teach or suggest all of the elements of claims 15 and 16, these claims are not rendered obvious over Sayed-Bolorforosh in view of Hanafy.

Claims 17-21

Claims 17-21 are rejected under 103(a) as being unpatentable over Hanafy in view of Kline-Schoder. The Applicants respectfully traverse this rejection because a combination of Hanafy and Kline-Schoder does not produce the invention as claimed in claims 17-21.

"To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art." "All words in a claim must be considered in judging the patentability of that claim against the prior art." MPEP § 2143.03 (7th ed., Rev. 1, Feb. 2000).

As pointed out earlier, Hanafy discloses single matching layer on individual odd- and even-numbered transducer elements. Kline-Schoder merely mentions a matching layer covering the uppermost piezoelectric layer. Column 7, lines 38-39. Nowhere in a combination of Hanafy and Kline-Schoder can one find a teaching or suggestion of a method of making a matching layer comprising a plurality of sublayers, each formed at a time, having monotonically varying impedance values, as recited in claims 17-21.

Since a combination of Hanafy and Kline-Schoder does not teach, suggest, or provide a motivation to carry out the method as recited in claims 17-21, these claims are not rendered obvious over Hanafy in view of Kline-Schoder.

In view of the above, it is submitted that the claims are patentable and in condition for allowance. Reconsideration of the rejection is requested. Allowance of claims at an early date is solicited.

Respectfully submitted,

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ATTACHMENTVERSION OF CLAIMS WITH MARKINGS TO SHOW CHANGES MADE

4. (Amended) [The] A matching layer for an ultrasound probe [of claim 1], said matching layer comprising a plurality of sublayers attached together, the sublayers having different impedance values, a first sublayer of the plurality of sublayers being disposed adjacent to an element of a transducer of the ultrasound probe, a last sublayer of the plurality of sublayers being disposed adjacent to a target, the impedance value of the first sublayer being less than or equal to the impedance value of the element of the transducer, the impedance value of the last sublayer being greater than or equal to the impedance value of the target, the impedance values of the sublayers decreasing from the first to the last sublayer, wherein each of the sublayers has a thickness of less than about 100 μm , preferably less than about 75 μm , more preferably less than about 50 μm , and most preferably less than 10 μm .